Causes Of Blindness

Among Blind Pension Recipients

In Missouri

DIVISION OF WELFARE

RESEARCH REPORT NO. 4

DEPARTMENT OF PUBLIC HEALTH AND WELFARE

STATE OFFICE BUILDING JEFFERSON CITY, MISSOURI

State of Missouri

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FOREWORD

Publication of carefully compiled statistics of the causes of blindness are of great value to ophthalmologists, public health and welfare officers, and all physicians, because such statistics indicate wherein preventive medicine must be encouraged. The comparison of such statistics compiled at intervals of a generation or so shows in which fields preventive medicine programs have succeeded, and in which fields they have yet to succeed. The present publication shows rather dramatically the partial conquest of the infectious diseases, especially trachoma, as a cause of blindness in the younger age groups. The figures also show that the greatest unsolved problem in the prevention of blindness in Missouri is the early recognition and treatment of glaucoma.

Special attention should be directed to the geographical tables in this study, for there are rather marked regional differences in the incidence of causes of blindness. All physicians would do well to study these tables with some care, so that regional problems will be better understood in the early recognition of potential causes of blindness.

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CAUSES OF BLINDNESS AMONG BLIND PENSION RECIPIENTS IN MISSOURI

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The Division of Welfare of the State Department of Public Health and Welfare is the responsible agency for the administration of the blind pension program in Missouri. Missouri remains one of three states which operates an assistance program for the blind without federal participation under the Social Security Act, finances being derived from a property tax of 3 cents per $100 valuation.

The statistical information contained in this report pertains to 2,831 blind persons on the pension rolls as of December 1949. The source of data used were the eye examinations made by ophthalmologists in determining the degree of blindness as a part of the eligibility requirements of these recipients. The following information taken from these forms has been analyzed in this study; etiological causes of blindness, location and type of eye disorder, degree of blindness, present age, age at onset of blindness, race and sex.

Differences in the rules governing administration and eligibility must be taken into consideration in comparing information contained in this study with that for other states. For example, most states have accepted the definition of blindness recommended by the Federal Bureau of Public Assistance, which includes as "blind" those having central visual acuity of 20/200 or less in the better eye with correction, or those with better than 20/200 visual acuity if the peripheral field is reduced to a diameter of 20 degrees or less. The definition contained in the Missouri Statutes is more limiting, since it includes only those having light perception or perception of motion at a distance not greater than 1 foot from the eye. It should also be pointed out that although Missouri is more limiting in its definition of blindness its property and income limitations are more

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liberal than many other states, allowing up to $5,000 in real property and $1,200 a year income from sources other than the pension.

It must be remembered that the pension roll gives only an incomplete picture as it does not represent the total amount of blindness in a state. However, it is reasonable to assume that valuable indications as to causes of blindness among the total blind population of the state may be obtained from a study of this type.

The Etiological Classification of Causes of Blindness.- The etiological classification is determined by the accident or disease responsible for the physiological or pathological changes in the eye, that is, by the cause underlying the eye condition. The most frequently occuring causes of blindness are infectious diseases. The most important infectious diseases contributing to blindness are trachoma and syphilis, accounting for 10.1 per cent and 7.9 per cent, respectively (Table 1). Syphilis had the highest incidence among negroes, being responsible for 21.9 per cent of the blindness in this race as compared with 5.0 per cent in the Caucasian race. Trachoma was the cause of blindness in 12.2 per cent of the white cases, while none of the negro cases listed this as a cause. Ophthalmia neonatorum was responsible for blindness in 3.6 per cent of the cases. This is an infection of the eyes of newly-born infants and is usually caused by a gonorrheal infection. Protection against this is always taken by the attending physician, thus it is in births unattended by a physician that ophthalmia neonatorum may develop.

Diseases of prenatal origin, (excluding prenatal syphilis) accounted for blindness in 10.2 per cent of the cases. In 1.5 per cent, the hereditary origin could be definitely established, hereditary origin was presumed in 3.5 per cent and 5.2 per cent were of prenatal origin without specified cause. It is interesting to note that blindness due to prenatal diseases was almost three times as common in the Caucasian race as in the negro.

Injuries, including chemical burns, accounted for

TABLE 1. ETIOLOGICAL CLASSIFICATION OF BLINDNESS OF RECIPIENTS OF BLIND PENSIONS

Etiological Classification	Total/		White		Negro	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Total	2,831	100.0	2,345	100.0	485	100.0
Infectious Diseases						
Gonorrhea	10	0.4	7	0.3	3	0.6
Ophthalmia neonatorum	103	3.6	83	3.5	20	4.1
Syphilis						
Prenatal	15	0.5	9	0.4	6	1.2
Acquired after birth	145	5.1	78	3.3	66	13.7
Origin not specified	64	2.3	30	1.3	34	7.0
Trachoma	286	10.1	286	12.2		
Tuberculosis	5	0.2	4	0.2	1	0.2
Other	149	5.3	124	5.3	25	5.2
Diseases of Prenatal Origin						
Hereditary established	42	1.5	42	1.8		
Hereditary presumed	98	3.5	92	3.9	6	1.2
Prenatal cause not specified	148	5.2	134	5.7	14	2.9
Trauma (including chemical burns)						
Non-occupational Trauma						
Birth process	6	0.2	6	0.3		
Play or sport	64	2.3	58	2.5	6	1.2
Household activities	9	0.3	8	0.3	1	0.2
Traffic and transport	19	0.7	16	0.7	3	0.6
Other non-occupational	65	2.3	42	1.8	23	4.7
Occupational Trauma	105	3.7	92	3.9	13	2.7
Trauma not specified	37	1.3	30	1.3	7	1.4
Non-infectious diseases						
Anemia	1	*			1	0.2
Diabetes	38	1.3	34	1.5	4	0.8
Vascular or cerebral-vascular lesions	33	1.2	30	1.3	3	0.6
Central nervous system diseases	9	0.3	7	0.3	2	0.4
Other	22	0.8	20	0.9	2	0.4
Neoplasms	28	1.0	24	1.0	4	0.8
Poisonings	10	0.4	7	0.3	3	0.6
Unknown to science	929	32.8	766	32.6	163	33.7
Undetermined or not specified	391	13.7	316	13.4	75	15.6

/ Includes 1 case of "Other" race.
* Less than one tenth of one per cent.

blindness in 10.8 per cent of the cases. There were 5.8 per cent of the cases blinded by non-occupational injuries. The most important of the non-occupational injuries was play or sport accounting for 2.3 per cent of the cases. Occupational injuries accounted for blindness in 3.7 per cent of the cases. It must be pointed out here that this is a study of blind pension recipients and it is probably true that a great many people who lose their sight through occupational injuries receive financial compensation in an amount which renders them ineligible for the Missouri blind pension.

Non-infectious diseases accounted for blindness in 3.6 per cent of the total cases. Diabetes was the most important non-infectious disease, accounting for blindness in 1.3 per cent of the cases, while vascular or cerebral-vascular lesions accounted for 1.2 per cent.

Neoplasms accounted for loss of sight in 28 cases and poisonings in 10 cases.

In 929 or 32.8 per cent of the cases the cause of blindness was "unknown to science". The bulk of this group includes eyes blinded by primary glaucoma, senile cataract, or myopia. The etiology could not be determined by the examiner or was not specified in 13.7 per cent of the cases.

Topographic Site of Blindness.- The eyeball in general was involved in 38.5 per cent of all blindness (Table 2). The most important affection of not only this kind but of all types was glaucoma which accounted for blindness in 20.8 per cent of all cases. Glaucoma would seem to be somewhat less prominent in the Caucasian race than in the negro race, accounting for 20.2 per cent and 23.8 per cent, respectively. Degenerative changes were reported in 5.4 per cent of the cases and structural anomalies in 3.8 per cent. It is interesting to note that structural anomalies were reported in 4.2 per cent of the white cases and only 1.6 per cent of the negro.

The optic nerve was affected in 13.9 per cent of the total. Primary optic atrophy was present in 11.6 per cent, over half of which were definitely caused by syphilis. Retrobulbar and intra-cranial lesions were present in 1.2 per cent of the cases and other affections of the optic nerve accounted for 1.1 per cent of the total.

In 362 cases or 12.9 per cent blindness was caused by the crystalline lens being affected. The most common affection of the lens was cataract which accounted for 12.8 per cent of all cases. There were 13.4 per cent of the white cases affected by cataract as compared with 10.4 per cent of the negro cases. Only one case was reported with dislocated lens and 4 were re-

TABLE 2. TOPOGRAPHICAL CLASSIFICATION OF BLINDNESS OF RECIPIENTS OF BLIND PENSIONS

Topographical Classification	Total/		White		Negro	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Total	2,831	100.0	2,345	100.0	485	100.0
Eyeball in General						
Glaucoma	587	20.8	472	20.2	115	23.8
Myopia	20	0.7	20	0.9		
Structural anomalies	107	3.8	99	4.2	8	1.6
Degenerative changes	151	5 4	134	5.7	17	3.5
Other	219	7.8	176	7.5	43	8.9
Optic nerve						
Primary atrophy	328	11.6	207	8.8	120	24.8
Retrobular and Intra-cranial lesions	35	1.2	32	1.4	3	0.6
Other	32	1.1	25	1.1	7	1.4
Crystalline Lens						
Cataract	362	12.8	312	13.4	50	10.4
Dislocated lens	1	*	1	*		
Other	4	0.1	3	0.1	1	0.2
Cornea						
Keratitis, interstitial	6	0.2	4	0.2	2	0.4
Keratitis, ulcerative	98	3.5	87	3.7	11	2.3
Pannus	1	*	1	*		
Ulceration and vascularization	205	7.3	205	8.7		
Other	38	1.3	32	1.4	6	1.2
Choroid and Retina						
Choroiditis	12	0.4	12	0.5		
Retinitis	23	0.8	17	0.7	6	1.2
Detached retina	40	1.4	36	1.5	4	0.8
Retinal hemorrhage	14	0.5	14	0.6		
Retinal degeneration	148	5.2	140	6.0	8	1.6
Arteriosclerotic disease of choroid and retina	22	0.8	19	0.8	3	0.6
Other	57	2.0	47	2.0	10	2.1
Iris and Ciliary Body						
Iritis	26	0.9	22	0.9	4	0.8
Iridocyclitis and uveitis	138	4.9	101	4.3	37	7.6
Kerato-iritis	52	1.8	38	1.6	14	2.9
Sympathetic ophthalmia	87	3.1	74	3.2	13	2.7
Other						
Miscellaneous and Ill-Defined	18	0.6	15	0.6	3	0.6

/ Includes 1 case of "Other" race .
* Less than one tenth of one per cent.

ported with lens affections other than the two listed.

Blindness was produced by affections of the cornea in 12.3 per cent of the cases. Ulceration and vascularization was the most important affection of the cornea, accounting for 7.3 per cent of the total cases. Ulcerative keratitis ranked second in this group and was reported in 3.5 per cent of the cases. Among the white cases ulceration and vascularization was reported for 8.7 per cent, while none of the negro cases were reported with this affection.

In 316 or 11.1 per cent the visual loss was due to affections of the choroid and retina. Retinal degeneration, including retinitis pigmentosa, was the affection causing blindness in 5.2 per cent of the cases. Retinitis pigmentosa is a chronic progressive inflamation of the retina with atrophy and pigmentary infiltration of the inner layers.

Diseases of the iris and ciliary body were responsible for blindness in 10.7 per cent of the cases. Iridocyclitis and uveitis were the most important diseases of this group accounting for 4.9 per cent of the total. Next in importance was sympathetic ophthalmia, accounting for blindness in 3.1 per cent of the cases.

Relationship of Cause and Location of Eye Affection.- The location of eye affection is very often related to the cause of blindness. That is to say that certain diseases almost always affect certain specified parts of the eye.

Affections of the eyeball other than glaucoma accounted for 40.3 per cent of the affections attributed to hereditary or prenatal origin (Table 3). There were 28.4 per cent of the affections of the eyeball caused by infectious diseases other than syphilis and trachoma and an additional 17.7 per cent were caused by non-occupational accidents. The etiology was "unknown to science" in 581 cases of the 587 reported to have glaucoma.

Trachoma was responsible for over three-fourths of the cases in which blindness was produced by affections of the cornea. In only 24 cases did trachoma affect parts of the eye other than the cornea. Corneal blindness was due to accidents in only 2.6 per cent of these cases, while 10.1 per cent were undetermined as to cause.

Blindness was produced by affections of the lens in 367 cases, with cataract being the particular type of disturbance in 362 of these cases. Etiologically, 83.9 per cent of this group were classified as "unknown to science", and 8.4 per cent were attributable to prenatal causes.

TABLE 3. SITE AND TYPE OF AFFECTION CLASSIFIED BY ETIOLOGY

Etiology	Total	Eyeball in General		Cornea	Lens	Optic Nerve		Choroid and Retina	Iris and Ciliary Body	Other
		Glaucoma	Other			Optic Nerve Atrophy	Other			
Total	2,831	587	497	343	367	328	67	316	303	18
Infectious diseases										
Syphilis	224		3	3		188	4	12	14	
Trachoma	286		22	262	1				1	
Other	267		141	25		19	9	11	61	1
Accidents										
Occupational	107		70	6	5	5	1	5	15	
Other	208		88	3	4	18	8	11	76	
Neoplasms, all types	28		1	1		7	19			
General diseases										
Diabetes	38				8	1		27	1	1
Other	65		4	3	2	5	10	37	3	1
Hereditary or prenatal origin	288	6	116	3	31	11	1	119		1
Unknown to science	929	581	16	7	308	3		14		
Undetermined	391		36	35	8	71	15	80	132	14

Optic nerve atrophy was reported to be caused by syphilis in 188 of the 328 cases reporting this affection. In 21.6 per cent of the optic nerve atrophy cases the etiology was undetermined. The important cause of optic nerve affections, other than atrophy, seems to be neoplasms accounting for 28.4 per cent of such cases.

Of the 316 cases in which the choroid and retina were affected, 119 were of hereditary or prenatal origin, and the etiology was undetermined in 80 of these cases. General diseases, other than diabetes, affected the choroid and retina in 37 cases. Diabetes was reported in only 38 cases, 27 of which affected the choroid and retina.

The cause was undetermined in about one-third of the cases in which the iris and ciliary body were affected. Infectious diseases accounted for 25.1 per cent of the affections of the iris and ciliary body and accidents accounted for 30.0 per cent.

Degree of Blindness.- As stated previously, one of the eligibility requirements for the Missouri blind pension is that the person must not have greater vision than is sufficient only to distinguish light from darkness and recognize the motion (not the form) of the hand of the examiner at a distance not greater than one foot. Of the 2,831 recipients in this study, 13.3 per cent had motion perception, 29.3 per cent had light perception only and over half (57.4 per cent) were totally blind

(Table 4). In comparing the Caucasian race with the negro race as to degree of blindness, a substantial difference is noted. There were 76.3 per cent of the negro cases totally blind as compared with 53.5 per cent of the white cases. Light perception was reported for 19.4 per cent of the negro cases, and for 31.3 per cent of the white cases. There were 15.2 per cent of the white cases who were reported as having motion perception as compared with 4.3 per cent of the negro. The much larger incidence of total blindness among the negro cases may be explained by the fact that a much larger percentage of negro cases had primary optic atrophy which almost always results in total blindness, and they also reported a larger percentage of glaucoma which if not given proper treatment in the early stages results in total blindness.

TABLE 4. BLIND PENSION RECIPIENTS CLASSIFIED AS TO DEGREE OF BLINDNESS

Degree of Blindness	Number	Per Cent
Total	2,831	100.0
Total blindness	1,626	57.4
Light perception only	829	29.3
Motion perception	376	13.3
Not specified		

Sex and Race.- There were 2,345 white cases among the blind pension recipients in Missouri. Of these, 52.8 per cent were male and 47.2 per cent were female (Table 5). Of the 485 negro cases, 57.3 per cent were male and 42.7 per cent were female. One male case was reported as being of a race other than white or negro. Of the total cases, 53.6 per cent were male and 46.4 per cent female.

TABLE 5. BLIND PENSION RECIPIENTS CLASSIFIED AS TO SEX AND RACE

Sex	White		Negro	
	Number	Per Cent	Number	Per Cent
Total	2,345	100.0	485	100.0
Male	1,239	52.8	278	57.3
Female	1,106	47.2	207	42.7

Age.- The following figures clearly indicate that economic blindness is predominantly a handicap of the later years of life. There were 65.0 per cent of the cases over 60 years of age, while only 12.6 per cent of the total state population is over 60 (Table 6). In the age group of from 50 to 59, one finds 16.2 per cent of the blind pension recipients as compared with only 10.8 per cent of the total state population. There are 42.6 per cent of the population between 21 and 49 years of age, while only 18.8 per cent of the blind pension recipients are in this group. In comparing the male recipients with the female, one finds that 70.9 per cent of the female recipients are over 60 years of age, while 59.9 per cent of the males are in this age group. However, this difference is largely represented in the age group of 80 and over with only 14.2 per cent of the males in this group as compared with 24.8 per cent of the females.

TABLE 6. BLIND PENSION RECIPIENTS CLASSIFIED AS TO AGE AND SEX

Age	Total		Male		Female		Per Cent of Total State Population*
	Number	Per Cent	Number	Per Cent	Number	Per Cent	
Total	2,831	100.0	1,518	100.0	1,313	100.0	66.0
21-29	107	3 8	59	3.9	48	3.7	14.3
30-39	140	4.9	87	5.7	53	4.0	15.1
40-49	285	10.1	182	12.0	103	7.8	13.2
50-59	460	16.2	281	18.5	179	13.6	10.8
60-69	655	23.2	362	23.9	293	22.3	7.5
70-79	643	22.7	331	21.8	312	23.8	4.0
80 and over	541	19.1	216	14.2	325	24.8	1.1

* 34.0 per cent of the population is between 0 and 20 years of age.

Age at Onset of Blindness.- The proportion of blind pension recipients who have lacked sight since birth is relatively small and will probably become smaller year by year. The process of losing sight is likely to have extended over several years at least for a large majority of all blind persons. Because of this, exact information concerning the age at which blindness of a particular degree occurred is often not easily obtained. However, most blind persons can fix approximately the age at which they began to have serious difficulty due to loss of vision.

Among the blind pension recipients 7.3 per cent have been blind since birth and only 1.7 per cent lost their sight between birth and 1 year of age (Table 7). The incidence of blindness increased steadily with age reaching a peak in the decade between 50 and 60 years of age. There were 44.8 per cent of the blind pension recipients over 50 years of age at onset of blindness.

TABLE 7. BLIND PENSION RECIPIENTS CLASSIFIED AS TO AGE AT ONSET OF BLINDNESS

Age at Onset	Total		White		Negro	
	Number	Per Cent*	Number	Per Cent*	Number	Per Cent*
Total	2,831 /	100.0	2,345	100.0	485	100.0
Prenatal	99	3.6	93	4 0	6	1.3
At birth	104	3.7	84	3.6	20	4.2
Birth to 1 year	47	1.7	43	1.9	4	0.8
1-9	193	6.9	178	7.7	15	3.1
10-19	221	7.9	192	8.3	29	6.0
20-29	246	8.8	190	8.2	56	11.7
30-39	271	9.7	191	8.3	79	16.5
40-49	360	12.9	283	12.3	77	16.0
50-59	431	15.5	343	14.9	88	18.3
60-69	381	13.7	327	14.2	54	11.3
70 and over	434	15.6	382	16.6	52	10.8
Not specified	44		39		5	

/ Includes 1 case of "Other" race.
* Percentages computed exclude "Not specified".

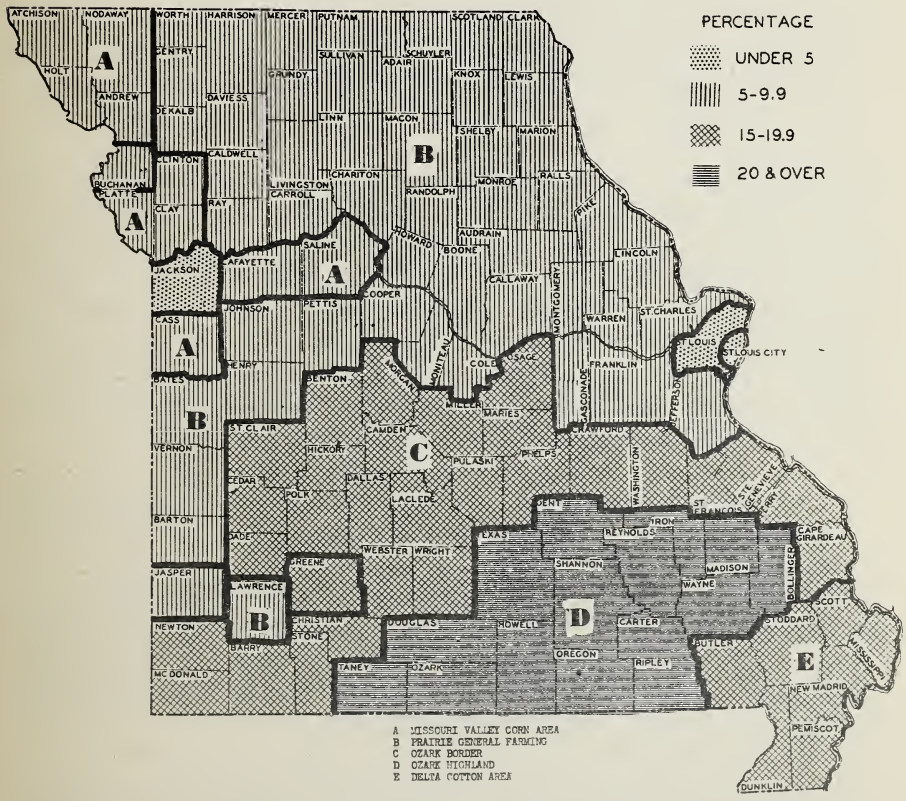
In comparing the age at onset of blindness in the Caucasian race with the negro race, some interesting differences are noted. Among the white cases 4.0 per cent became blind during the prenatal period as compared with 1.3 per cent of the negro cases. However, a larger percentage of negroes became blind at birth. Between the ages of 10 and 40, 24.8 per cent of the white cases became blind while, 34.2 per cent of the negro cases lost their sight during this period.

Geographical Distribution.- The state of Missouri was divided into five rural districts and data were tabulated for each of these districts and also for each of the six urban areas in order to determine if some types of blindness occur more frequently in certain areas.*

*Urban areas in Missouri are St. Louis City, Jackson County, St. Louis County, Buchanan County, Greene County and Jasper County. The state, exclusive of the

By referring to Table 8 it is noted that trauma is the most important of the known etiological causes of blindness with a rate in the state of 8.1 per 100,000 population. Non-occupational trauma had a rate of 4.3 per cent, while occupational trauma reported a rate of 2.8. Jasper County had by far the highest rate of occupational trauma (11.4 per 100,000 population), followed by Greene County with a rate of 5.6. The very high incidence of occupational trauma in Jasper County is probably explained by the large amount of mining

Blind Pension Recipients Per 100,000 Population, With Blindness Caused By Trachoma



urban counties, was then divided into District A, composed of the Missouri Valley Corn Area; District B, composed of the Prairie General Farming Area; District C, composed of the Ozark Border Area; District D, composed of the Ozark Highland Area; and District E, composed of the Delta Cotton Area.

activity in this area. St. Louis County had the lowest rate of occupational trauma (1.1) followed by St. Louis City with a rate of 1.3. In the rural areas the Ozark Border region reported the highest rate of 4.1, while the Missouri Valley Corn Area reported the lowest rate of 2.0.

Diseases of prenatal origin were important etiological causes of blindness with a rate in the state of 7.6 per 100,000 population. Of all the areas in the state, Jasper County and the Ozark Highland region had the highest rates, both reporting a rate of 12.6. St. Louis County again had the lowest rate of any area in the state.

Trachoma is one of the most important of the known etiological causes of blindness with a rate in the state of 7.6 per 100,000 population. A high incidence of trachoma is usually found in areas characterized by poverty, nutritional deficiency, and lack of adequate sanitary facilities. As is to be expected, the smallest trachoma rates were found in St. Louis County (0.7 per 100,000 population) and St. Louis City (1.1 per 100,000 population). Among the urban areas, Greene County had the highest incidence of trachoma with a rate of 15.5 followed by Jasper with a rate of 7.6. Of the five rural districts, the Ozark Highland Area reported the highest rate of 22.7, followed by the Delta Cotton Area with a rate of 19.4. The Missouri Valley Corn Area had the lowest rate of the five rural districts.

Syphilis ranked high in importance in the state with a rate of 5.9 per 100,000 population. The urban areas ranked higher than the rural areas, and St. Louis City ranked first with a rate of 11.1, followed by Buchanan with a rate of 10.6. In the rural areas, the Delta Cotton region reported the highest rate (6.7 per 100,000 population), while the Ozark Border Area reported the lowest (1.4 per 100,000 population).

Glaucoma was by far the most important type of eye affection in the state with a rate of 15.5 per 100,000 population (Table 9). Among the urban areas Jasper County had the highest incidence of glaucoma, with a

rate of 17.8, next in importance was St. Louis City with a rate of 14.5, while St. Louis County had the lowest rate in the state (8.0). In the rural areas, the Ozark Highland region had the highest rate (22.1 per 100,000 population), followed by the Prairie General Farming Area with a rate of 18.5. From these data it would seem that Glaucoma is proportionately more prevalent in the rural areas.

Second in importance in the type of eye affection is cataract with a rate of 9.6 per 100,000 population. In both the urban and rural areas the Prairie General Farming region had the highest incidence of cataract with a rate of 14.5. This is to be expected due to the great amount of aged population within this area and cataract is the most common eye defect of old age. Of the remaining rural areas cataract had the highest rate (12.6) in the Ozark Border region. Among the urban areas Jasper County had the highest rate (11.4), followed by Greene with 11.1.

Optic nerve atrophy ranks next to cataract as an eye condition responsible for blindness. As previously stated, this is the most common eye affection resulting from syphilitic infection. The state rate for atrophy of the optic nerve was 8.7 per 100,000 population with Jackson County having the highest rate of any area in the state (13.4 per 100,000 population). In the state as a whole the Ozark Border region had the lowest rate (3.6), and these tabulations indicate that optic atrophy is proportionately more prominent in the urban areas of the state.

Ulceration and vascularization was the most common affection of the cornea with a rate in the state of 5.4. Trachoma is the most common cause of this affection, and thus those areas in the state with a high incidence of trachoma also have a high rate of ulceration and vascularization. Among the urban areas Greene County reported the highest rate, while in the rural areas the highest rates were reported by the Ozark Highland region and the Delta Cotton region.

The most important affection of the choroid and retina was retinal degeneration with a state rate of 3.9. Retinal degeneration seems to be more prevalent in the rural areas with the Ozark Highland Area reporting the highest rate in the state (7.4 per 100,000 population). Iridocylitis and uveitis being the most common affection of the iris and ciliary body received a rate of 3.6. The highest rate was reported by Greene County, while the lowest was reported by the Missouri Valley Corn region.

Comparison With Other Studies.- The National Society for the Prevention of Blindness prepared a study of blind pension recipients in Missouri as of March 1944 and some comparisons with that study have been made wherever possible. Syphilis seems to have decreased slightly since 1944 when 8.7 per cent of the cases reported syphilis as an etiological factor with 7.9 per cent being reported in this study. Trachoma also declined with 12.3 per cent of the cases affected in 1944 as compared with 10.1 per cent in this study. It is very interesting to note that trachoma accounted for blindness in 25.5 per cent of the blind pension recipients on the rolls in 1926. From these figures one sees the effectiveness of the trachoma control program in Missouri.

The data indicate an increase in glaucoma and cataract, and points to the fact that glaucoma is still the outstanding problem in the state. The slight increase in cataract may be explained by an increase of 1 per cent in the number of recipients 60 years of age and over as cataract is primarily an affection of old-age.

In 1947 the Federal Security Agency's Bureau of Public Assistance published a report combining studies of the causes of blindness in 20 states. This report represented almost 21,000 blind assistance recipients and the studies by the state agencies were made in the period between November 30, 1940 and December 31, 1941.

Syphilis was the recorded etiology for 7.7 per cent of the total cases in the federal study and Missouri

compares very closely with 7.9 per cent. In the federal study the percentages ranged from a low of 1.3 per cent in North Dakota to a high of 15.0 per cent in Maryland.

Trachoma was reported as the etiological factor causing blindness in 10.1 per cent of the cases in Missouri which is somewhat higher than the 7.5 per cent of the total reported in the federal study. It is somewhat surprising that these percentages compare as closely as they do since southern Missouri has always been considered a part of the trachoma belt. This belt extends westward from West Virginia and embraces large portions of that state, Kentucky, Tennessee, Missouri, Arkansas, and Oklahoma, and smaller parts of Ohio, Indiana, Illinois and Kansas. Since 6 of these 10 states are included in the federal study the proportion of trachoma cases is probably somewhat high for the United States as a whole. It must also be noted that a majority of the people in Missouri do not live in the southern area where trachoma is particularly prevalent.

There were 10.5 per cent of the total cases in the federal study affected by glaucoma, while in Missouri 20.8 per cent of the cases reported glaucoma as the affection causing blindness. Since glaucoma, like cataract, is primarily an affection of old age, this larger percentage reported by Missouri may be partially explained by the fact that 65.0 per cent of Missouri's cases were over 60 years of age as compared with 46.7 per cent in the federal study being 60 years of age and over. Another factor which may contribute to the larger percentage in Missouri is the fact that Missouri has a much more limited definition of blindness than the states represented in the federal study, and as glaucoma, if not given treatment in its early stages, usually results in total blindness the percentage of glaucoma cases would naturally be higher in Missouri than in those states with a more liberal definition who may place cases on the pension rolls with affections resulting in a degree of vision which would render them ineligible in Missouri.

In Missouri cataract was reported in 12.8 per cent of the cases which was much lower than the percentage (19.5) reported in the federal study. This lower percentage is probably due again to Missouri's limited definition of blindness which would tend to reduce the number of cases with cataract on the rolls in relation to the number on the rolls in those states with a more liberal definition due to the rather slow development of

Table 8. Etiological Classification of Blindness of

Etiological Classification	Total			St. Louis City		
	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000
Total	2,831	100.0	74.8	579	100.0	71.0
Infectious diseases						
Gonorrhea	10	0.4	0.3	2	0.3	0.2
Ophthalmia neonatorum	103	3.6	2.7	37	6.4	4.6
Syphilis						
Prenatal	15	0.5	0.4	8	1.4	1.0
Acquired after birth	145	5.1	3.8	66	11.4	8.1
Origin not specified	64	2.3	1.7	16	2.8	2.0
Trachoma	286	10.1	7.6	9	1.6	1.1
Tuberculosis	5	0.2	0.1	1	0.2	0.1
Other	149	5.3	3.9	46	7.9	5.7
Diseases of prenatal origin						
Hereditary established	42	1.5	1.1	6	1.0	0.7
Hereditary presumed	98	3.5	2.6	19	3.3	2.3
Prenatal cause not specified	148	5.2	3.9	46	7.9	5.7
Trauma (including chemical burns)						
Non-occupational trauma						
Birth process	6	0.2	0.2	2	0.3	0.2
Play or sport	64	2.3	1.7	15	2.6	1.8
Household activities	9	0.3	0.2	2	0.3	0.2
Traffic and transport	19	0.7	0.5	4	0.7	0.5
Other non-occupational	65	2.3	1.7	13	2.2	1.6
Occupational trauma	105	3.7	2.8	11	1.9	1.3
Trauma not specified	37	1.3	1.0	9	1.6	1.1
Non-infectious diseases						
Anemia	1	*	**			
Diabetes	38	1.3	1.0	6	1.0	0.7
Vascular or cerebral-vascular lesions	33	1.2	0.9	5	0.9	0.6
Central nervous system diseases	9	0.3	0.2	2	0.3	0.2
Other	22	0.8	0.6			
Neoplasms	28	1.0	0.7	12	2.1	1.5
Poisonings	10	0.4	0.3	5	0.9	0.6
Unknown to science	929	32.8	24.6	166	28.7	20.4
Undetermined or not specified	391	13.7	10.3	71	12.3	8.8

* Less than one-tenth of one per cent.
** Less than one tenth.

cataracts. In Missouri the law also states that a person who is under 75 years of age must agree to submit to treatment or operation to effect a cure if recommended by the examining oculist and since most cataracts may be removed by operation many people with cataracts never receive the blind pension or if they do it is only for a short time prior to removal of the cataract.

Recipients of Blind Pensions by Districts

Jackson County			St. Louis County			Buchanan County			Greene County		
Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000
338	100.0	70.7	96	100.0	35.0	61	100.0	64.8	83	100.0	91.7
1	0.3	0.2									
13	3.8	2.7	1	1.0	0.4	3	4.9	3.2	1	1.2	1.1
1	0.3	0.2				1	1.6	1.1	1	1.2	1.1
17	5.0	3.6	7	7.3	2.5	7	11.5	7.4	1	1.2	1.1
17	5.0	3.6	4	4.2	1.5	2	3.3	2.1			
10	3.0	2.1	2	2.1	0.7	7	11.5	7.4	14	16.9	15.5
8	2.4	1.7	8	8.3	2.9				3	3.6	3.3
2	0.6	0.4							2	2.4	2.2
6	1.8	1.3	2	2.1	0.7	4	6.6	4.2	1	1.2	1.1
18	5.3	3.8	6	6.3	2.2	2	3.3	2.1	3	3.6	3.3
			1	1.0	0.4						
12	3.6	2.5	2	2.1	0.7	1	1.6	1.1	4	4.8	4.4
						1	1.6	1.1	1	1.2	1.1
2	0.6	0.4				1	1.6	1.1			
7	2.1	1.5	2	2.1	0.7				1	1.2	1.1
14	4.1	2.9	3	3.1	1.1	2	3.3	2.1	5	6.0	5.6
8	2.4	1.7	1	1.0	0.4				1	1.2	1.1
1	0.3	0.2									
8	2.4	1.7	4	4.2	1.5				2	2.4	2.2
9	2.7	1.9	2	2.1	0.7				1	1.2	1.1
2	0.6	0.4	1	1.0	0.4						
2	0.6	0.4				1	1.6	1.1	1	1.2	1.1
4	1.2	0.8	1	1.0	0.4	1	1.6	1.1	1	1.2	1.1
2	0.6	0.4									
109	32.1	22.7	31	32.3	11.3	21	34.5	22.3	19	22.9	21.0
65	19.2	13.6	18	18.8	6.5	7	11.5	7.4	21	25.4	23.2

Table 8. Etiological Classification of Blindness of

Etiological Classification	Jasper County			District A		
	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000
Total	86	100.0	109.3	95	100.0	47.9
Infectious diseases						
Gonorrhea				1	1.1	0.5
Ophthalmia neonatorum	5	5.7	6.4	4	4.2	2.0
Syphilis						
Prenatal				1	1.1	0.5
Acquired after birth	4	4.6	5.1	2	2.1	1.0
Origin not specified				2	2.1	1.0
Trachoma	6	7.0	7.6	10	10.4	5.1
Tuberculosis	1	1.2	1.3			
Other	6	7.0	7.6	1	1.1	0.5
Diseases of prenatal origin						
Hereditary established	2	2.3	2.5	2	2.1	1.0
Hereditary presumed	2	2.3	2.5			
Prenatal cause not specified	6	7.0	7.6	4	4.2	2.0
Trauma (including chemical burns)						
Non-occupational trauma						
Birth process	1	1.2	1.3			
Play or sport	2	2.3	2.5	1	1.1	0.5
Household activities						
Traffic and transport	1	1.2	1.3			
Other non-occupational	2	2.3	2.5	1	1.1	0.5
Occupational trauma	9	10.4	11.4	4	4.2	2.0
Trauma not specified	1	1.2	1.3	4	4.2	2.0
Non-infectious diseases						
Anemia						
Diabetes	1	1.2	1.3	2	2.1	1.0
Vascular or cerebral-vascular lesions	6	7.0	7.6			
Central nervous system diseases	1	1.2	1.3			
Other	2	2.3	2.5	1	1.1	0.5
Neoplasms	1	1.2	1.3	1	1.1	0.5
Poisonings	1	1.2	1.3			
Unknown to science	20	23.2	25.5	39	41.0	19.7
Undetermined or not specified	6	7.0	7.6	15	15.7	7.6

Recipients of Blind Pensions by Districts--Continued

District B			District C			District D			District E		
Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000
699	100.0	80.5	384	100.0	86.5	185	100.0	97.5	225	100.0	89.1
1	0.1	0.1	3	0.8	0.7	1	0.5	0.5	1	0.4	0.4
14	2.0	1.6	6	1.6	1.4	8	4.3	4.2	11	4.9	4.3
2	0.3	0.2	1	0.3	0.2						
22	3.1	2.5	2	0.5	0.5	5	2.7	2.6	12	5.3	4.7
15	2.1	1.7	3	0.8	0.7				5	2.2	2.0
59	8.5	6.8	77	20.1	17.3	43	23.3	22.7	49	21.8	19.4
			1	0.3	0.2				2	0.9	0.8
35	5.1	4.0	17	4.4	3.8	15	8.1	7.9	10	4.4	4.0
14	2.0	1.6	7	1.8	1.6	5	2.7	2.6	2	0.9	0.8
25	3.6	2.9	23	6.0	5.2	8	4.3	4.2	8	3.6	3.2
30	4.3	3.5	17	4.4	3.8	11	5.9	5.8	5	2.2	2.0
1	0.1	0.1							1	0.4	0.4
14	2.0	1.6	7	1.8	1.6	2	1.1	1.1	4	1.8	1.6
3	0.4	0.3	1	0.3	0.2				1	0.4	0.4
8	1.1	0.9	1	0.3	0.2				2	0.9	0.8
15	2.1	1.7	9	2.3	2.0	4	2.2	2.1	11	4.9	4.3
27	3.9	3.1	18	4.7	4.1	4	2.2	2.1	8	3.6	3.2
4	0.6	0.5	5	1.3	1.1	2	1.1	1.1	2	0.9	0.8
9	1.3	1.2	4	1.0	0.9	2	1.1	1.1			
5	0.7	0.6	4	1.0	0.9	1	0.5	0.5			
1	0.1	0.1	1	0.3	0.2	1	0.5	0.5			
7	1.0	0.8	4	1.0	0.9				4	1.8	1.6
2	0.3	0.2	4	1.0	0.9				1	0.4	0.4
1	0.1	0.1	1	0.3	0.2						
289	41.4	33.3	118	30.7	26.6	55	29.8	29.0	62	27.6	24.5
96	13.8	11.1	50	13.0	11.3	18	9.7	9.5	24	10.7	9.5

Table 9. Topographical Classification of Blindness

Topographical Classification	Jasper County			District A		
	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000
Total	86	100.0	109.3	95	100.0	47.9
Eyeball in general						
Glaucoma	14	16.2	17.8	32	33.6	16.2
Myopia				1	1.1	0.5
Structural anomalies	3	3.5	3.8	2	2.1	1.0
Degenerative changes	5	5.8	6.4	8	8.4	4.1
Other	13	15.0	16.6	3	3.2	1.5
Optic nerve						
Primary atrophy	6	7.0	7.6	8	8.4	4.1
Retrobular and intra-cranial lesions	2	2.3	2.5	2	2.1	1.0
Other	1	1.2	1.3	1	1.1	0.5
Crystalline lens						
Cataract	9	10.5	11.4	7	7.3	3.5
Dislocated lens						
Other						
Cornea						
Keratitis, interstitial						
Keratitis, ulcerative	2	2.3	2.5	3	3.2	1.5
Pannus						
Ulceration and vascularization	6	7.0	7.6	5	5.2	2.5
Other	2	2.3	2.5	2	2.1	1.0
Choroid and retina						
Choroiditis						
Retinitis	3	3.5	3.8	2	2.1	1.0
Detached retina	3	3.5	3.8	3	3.2	1.5
Retinal hemorrhage						
Retinal degeneration	4	4.7	5.1	4	4.2	2.0
Arteriosclerotic disease of choroid and retina	5	5.8	6.4			
Other				2	2.1	1.0
Iris and ciliary body						
Iritis	1	1.2	1.3	1	1.1	0.5
Iridocyclitis and uveitis	4	4.7	5.1	4	4.2	2.0
Kerato-iritis	2	2.3	2.5	1	1.1	0.5
Sympathetic ophthalmia	1	1.2	1.3	4	4.2	2.0
Other						
Miscellaneous and ill-defined						

of Recipients of Blind Pensions by Districts

Jackson County			St. Louis County			Buchanan County			Greene County		
Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000
338	100.0	70.7	96	100.0	35.0	61	100.0	64.8	83	100.0	91.7
61	18.0	12.8	22	23.0	8.0	12	19.7	12.7	12	14.5	13.3
1	0.3	0.2							2	2.4	2.2
14	4.1	2.9	3	3.1	1.1	2	3.3	2.1	2	2.4	2.2
9	2.7	1.9	2	2.1	0.7	4	6.6	4.3	1	1.2	1.1
24	7.1	5.1	6	6.3	2.2				5	6.0	5.5
64	18.9	13.4	13	13.6	4.7	10	16.4	10.6	10	12.1	11.1
5	1.5	1.0				1	1.6	1.1	1	1.2	1.1
3	0.9	0.6				1	1.6	1.1			
43	12.7	9.0	14	14.6	5.1	10	16.4	10.6	10	12.1	11.1
1	0.3	0.2							1	1.2	1.1
8	2.4	1.7	1	1.0	0.4	1	1.6	1.1	6	7.2	6.6
8	2.4	1.7	2	2.1	0.7	7	11.5	7.4	7	8.5	7.8
8	2.4	1.7	2	2.1	0.7	2	3.3	2.1	2	2.4	2.2
1	0.3	0.2	1	1.0	0.4				2	2.4	2.2
2	0.6	0.4	2	2.1	0.7						
5	1.5	1.0	3	3.1	1.1				1	1.2	1.1
3	0.9	0.6	1	1.0	0.4						
14	4.1	2.9	5	5.2	1.8	3	4.9	3.1	3	3.6	3.3
8	2.4	1.7	1	1.0	0.4						
15	4.4	3.1	3	3.1	1.1	1	1.6	1.1	1	1.2	1.1
17	5.0	3.6	11	11.5	4.0	4	6.6	4.3	6	7.2	6.6
7	2.1	1.5	1	1.0	0.4	2	3.3	2.1	1	1.2	1.1
16	4.7	3.3	1	1.0	0.4	1	1.6	1.1	6	7.2	6.6
1	0.3	0.2	2	2.1	0.7				1	1.2	1.1

Table 9. Topographical Classification of Blindness

Topographical Classification	Total			St. Louis City		
	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000
Total	2,831	100.0	74.8	579	100.0	71.0
Eyeball in general						
Glaucoma	587	20.8	15.5	118	20.4	14.5
Myopia	20	0.7	0.5	6	1.0	0.7
Structural anomalies	107	3.8	2.8	29	5.0	3.6
Degenerative changes	151	5.4	4.0	48	8.3	5.9
Other	219	7.8	5.8	49	8.5	6.0
Optic nerve						
Primary atrophy	328	11.6	8.7	94	16.2	11.6
Retrobular and intra-cranial lesions	35	1.2	0.9	11	1.9	1.3
Other	32	1.1	0.8	11	1.9	1.3
Crystalline lens						
Cataract	362	12.8	9.6	51	8.8	6.3
Dislocated lens	1	*	**			
Other	4	0.1	0.1			
Cornea						
Keratitis, interstitial	6	0.2	0.2	4	0.7	0.5
Keratitis, ulcerative	98	3.5	2.6	6	1.0	0.7
Pannus	1	*	**			
Ulceration and vascularization	205	7.3	5.4	7	1.2	0.9
Other	38	1.3	1.0	9	1.6	1.1
Choroid and retina						
Choroiditis	12	0.4	0.3	1	0.2	0.1
Retinitis	23	0.8	0.6	5	0.9	0.6
Detached retina	40	1.4	1.1	13	2.2	1.6
Retinal hemorrhage	14	0.5	0.4	4	0.7	0.5
Retinal degeneration	148	5.2	3.9	30	5.2	3.7
Arteriosclerotic disease of choroid and retina	22	0.8	0.6	1	0.2	0.1
Other	57	2.0	1.5	10	1.7	1.2
Iris and ciliary body						
Iritis	26	0.9	0.7	5	0.9	0.6
Iridocyclitis and uveitis	138	4.9	3.6	33	5.7	4.0
Kerato-iritis	52	1.8	1.4	13	2.2	1.6
Sympathetic ophthalmia	87	3.1	2.3	18	3.1	2.2
Other						
Miscellaneous and ill defined	18	0.6	0.5	3	0.5	0.4

* Less than one tenth of one per cent.
** Less than one tenth.

of Recipients of Blind Pensions by Districts--Continued

District B			District C			District D			District E		
Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000	Number	Per Cent	Rate Per 100,000
699	100.0	80.5	384	100.0	86.5	185	100.0	97.5	225	100.0	89.1
160	22.8	18.5	70	18.3	15.8	42	22 7	22.1	44	19.6	17.3
3	0.4	0.3	5	1.3	1.1	2	1.1	1.1			
29	4.1	3.3	13	3.4	2.9	6	3.2	3.2	4	1.8	1 6
30	4.3	3 5	13	3.4	2.9	11	5.9	5 8	20	8.9	7.9
52	7.4	6.0	35	9.1	7.9	14	7.6	7.4	18	8.0	7.1
75	10.7	8.6	16	4.2	3.6	9	4.9	4.7	23	10.3	9.1
5	0.7	0.6	5	1.3	1.1	1	0.5	0.5	2	0.9	0.8
6	0.9	0.7	5	1.3	1.1	1	0.5	0.5	3	1.3	1.2
126	18.0	14.5	56	14.6	12.6	16	8.6	8.4	20	8.9	7.9
									1	0.4	0.4
2	0.3	0.2									
2	0.3	0.2									
27	3.9	3.1	27	7.0	6.1	10	5 4	5.3	7	3.1	2.8
1	0.1	0.1									
43	6.2	4.9	48	12.5	10.8	32	17.3	16 9	40	17.8	15.8
4	0.6	0.5	2	0.5	0.5	2	1.1	1.1	3	1.3	1.2
2	0.3	0.2	4	1.0	0.9	1	0.5	0.5			
5	0.7	0.6	3	0.8	0 7				1	0.4	0.4
6	0.9	0.7	4	1.0	0.9				2	0.9	0.8
1	0.1	0.1	3	0.8	0 7	2	1.1	1.1			
36	5.2	4.1	25	6.5	5.6	14	7.6	7.4	10	4.4	4.0
5	0.7	0.6	2	0.5	0.5						
11	1.6	1.3	8	2.1	1.8	4	2 2	2.1	2	0.9	0.8
11	1.6	1.3	4	1.0	0.9				1	0.4	0.4
27	3.9	3.1	13	3 4	2.9	9	4.9	4.7	10	4.4	4.0
8	1.1	0.9	6	1.6	1.4	5	2.7	2 6	6	2.7	2.4
18	2.6	2.1	12	3.1	2.7	4	2.2	2.1	6	2.7	2.4
4	0.6	0.5	5	1.3	1.1				2	0.9	0.8